

CHM 101 General Chemistry I 3 Units

Foundation Chemistry I

Physical Qualities and Units: The physical qualities understood as consisting of numerical magnitude and unit. International System of Units: Base units, mass length, time, current, amount of substance. Other units expressed as products or quotients of base units. Relative Masses of Atoms and Molecules: Relative atomic, isotopic, molecular and formula masses. The mole concepts and the Avogadro constant. Determination of relative masses. Calculation of empirical and molecular formulae. Chemical, Stoichiometry. Atomic and Nuclear Basis: Evidence of atomic constituents: Electrons, protons and neutrons – their relative charges and masses. The nucleus, atomic number, mass isotopes and mass spectra. The Electronic structure of the atom. Radioactivity; x-ray radiation and detection. Nuclear transformation and binding energy. Nuclear reaction and stability. Applications of radionuclides, electro- magnetic radiation, wavelength and frequency. Radiation as energy, the plank relation, regions of electromagnetic spectrum absorption and emission of radiation. Wave particle dualism and the de Broglie equation treated symbolically. Heisenberg uncertainty principle. Energy levels in atomic hydrogen and their quantum numbers. Ionization energy. The size, shape and orientation of atomic orbital. Radical and polar diagrams and the effect of nuclear charge. Electron and nuclear spin-the Stern-Gerlach experiment. Many electron atoms, electron configuration and Pauli principle. Hund's rule. Chemical Bonding: Dependence of properties of solids, liquids and Gases on type of chemical bonding. Electrovalent bond between ions. Covalent bonds. The shape of simple molecules including CO_2 (linear), CH_4 (tetrahedral), NH_3 (pyramidal), H_2O (non-linear), SO_2 (bent), SF_6 (octahedral). Metallic bonds. Intermolecular bonds. Hydrogen bonding and its influence on properties.